



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,769	09/28/2001	Peter Markstein	10008025-1	2994

7590 09/21/2005

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

FOWLKES, ANDRE R

ART UNIT	PAPER NUMBER
----------	--------------

2192

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/964,769

Applicant(s)

MARKSTEIN ET AL.

Examiner

Andre R. Fowlkes

Art Unit

2192

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

nc

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/23/05 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 6-9, 12-15, 18-21, 24 and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Lamping, U.S. Patent No. 6,631,517 (art made of record).

As per claim 1, Lamping discloses **a compiler used by a computer architecture to compile a family of related functions** (col. 1:10-11, "The present invention relates to the technique of compiling software"), comprising:

- **a member recognizer configured to recognize a member function from said family of related functions** (col. 1:47-50, "the specializer looks at codes submitted thereto (to recognize member functions), and makes an automatic inference, based on what information is known at a particular time, whether to "specialize" various portions of the program");

- **a family start caller configured to make a family-start function call for said family of related functions** (col. 3:29-37, "there is provided a method of processing a computer program, comprising submitting an expression in the program to a partial evaluator. If the partial evaluator determines a value which can be substituted for the expression without changing the result of the program, the partial evaluator returns to the program a first language construct (i.e. a family start call), and otherwise returns to the program a second language construct");

- **a member finish caller to make a member-finish function call for said member function** (col. 3:29-37, "there is provided a method of processing a computer program, comprising submitting an expression in the program to a partial evaluator. If the partial evaluator determines a value which can be substituted for the expression without changing the result of the program, the partial evaluator returns to the program a first language construct (i.e. a family start call), and otherwise returns to the program a second language construct (i.e. a member finish call)");

- **an optimizer configured to optimize said family-start function call**, (col. 1:10-11, "The present invention relates to the technique of compiling (and optimizing) software");

- wherein the optimized family-start function call causes execution of instructions that are common to the family of related functions to occur prior to execution of instructions for each of a plurality of member-finish functions to reduce a number of instructions executed by the computer architecture in computing more than one member function from said family of related functions, (col. 2:51-52, "A comparison function is used to search the sorted tables to identify (code) fragments that may be equivalent");

As per claim 2, the rejection of claim 1 is incorporated and further, Lamping discloses that the **optimizer is further configured to optimize said member finish function calls** (col. 1:10-11, "The present invention relates to the technique of compiling software", and col. 1:59-60, "the specialized program runs faster than the original program did").

As per claim 3, the rejection of claim 1 is incorporated and further, Lamping discloses that the **optimizer is configured to optimize on at least one of intermediate language level, architecture specific level, or operating system specific level** (col. 1:10-11, "The present invention relates to the technique of compiling software", and col. 1:59-60, "the specialized program runs faster than the original program did").

As per claim 6, the rejection of claim 1 is incorporated and further, Lamping discloses that **said family of related functions includes at least one of trigonometric, hyperbolic, or square root functions** (col. 5:11, "arithmetic functions").

As per claim 7, the rejection of claim 1 is incorporated and further, Lamping discloses that **said family of related functions is identified by use of a data store** (col. 2:51-52, "A comparison function is used to search the sorted tables (i.e. data store) to identify (code) fragments that may be equivalent").

As per claim 8, the rejection of claim 7 is incorporated and further, Lamping discloses that **data store includes at least one of a look-up table, an ASCII file, a binary file, or a database file** (col. 2:51-52, "A comparison function is used to search the sorted tables (i.e. look up table) to identify (code) fragments that may be equivalent").

As per claim 9, the rejection of claim 7 is incorporated and further, Lamping discloses that **said data store is modifiable** (col. 2:51-52, "A comparison function is used to search the sorted tables (i.e. data store) to identify (code) fragments that may be equivalent").

As per claim 12, the rejection of claim 1 is incorporated and further, Lamping discloses that **said member-finish function call makes use of a result returned from said family-start function call** (col. 3:29-37, "there is provided a method of processing a computer program, comprising submitting an expression in the program to a partial evaluator. If the partial evaluator determines a value which can be substituted for the expression without changing the result of the program, the partial evaluator returns to the program a first language construct (i.e. a family start call), and otherwise returns to the program a second language construct (i.e. a member finish call)").

As per claim 25, the rejection of claim 1 is incorporated and further, Lamping discloses that **at least one calculation is almost identical for each member function of the family of related functions** (col. 2:51-52, "A comparison function is used to search the sorted tables to identify (code) fragments that may be equivalent").

As per claim 26, the rejection of claim 25 is incorporated and further, Lamping discloses that **at least one calculation is identical for each member function of the family of related functions** (col. 2:51-52, "A comparison function is used to search the sorted tables to identify (code) fragments that may be equivalent").

As per claims 13-15, 18-21, 24, 27 and 28, this is a method version of the claimed compiler discussed above, in claims 1-3, 6-9, 12, 25 and 26, wherein all claimed limitations have also been addressed and/or cited as set forth above. For

example, see Lamping's computer system and method for parallel computations using table approximations (col. 1:10-5:36).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4, 5, 10, 11, 16, 17, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamping, U.S. Patent No. 6,631,517 in view of Aho et al., (Aho), "Compilers: Principles, Techniques, and Tools", ISBN: 0-201-10088-6.

As per claim 4, the rejection of claim 1 is incorporated and further, Lamping doesn't explicitly disclose that the optimizer is configured to **in-line expand** at least one of said family-start or member-finish calls.

However, Aho, in an analogous environment, discloses that the optimizer is configured to **in-line expand** at least one of said family-start or member-finish calls (p. 428:25-26, "in-line expansion ... for reducing the running time of a program").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Lamping to have the optimizer configured to use in-line expansion. The modification

Art Unit: 2192

would have been obvious because one of ordinary skill in the art would have wanted to decrease the running time of program code (Aho, p. 428:25-26).

As per claim 5, the rejection of claim 1 is incorporated and further, Lamping doesn't explicitly disclose that the **optimizer includes common subexpression elimination, code motion, and dead-code elimination**.

However, Aho, in an analogous environment, discloses that the **optimizer includes common subexpression elimination, code motion, and dead-code elimination** (p. 592:10-12, "Common subexpression elimination ... (and) dead-code elimination ... are common examples of such function preserving transformations", and p. 596:12-13, "An important modifications that decrease the amount of code in a loop is code motion").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Lamping to have the optimizer include common subexpression elimination, code motion, and dead-code elimination. The modification would have been obvious because one of ordinary skill in the art would have wanted to use these well-known optimization techniques to reduce the running time of the program code.

As per claim 10 the rejection of claim 1 is incorporated and further, Lamping doesn't explicitly disclose that one or both of said family start caller and said member

Art Unit: 2192

finish caller are configured to make said family-start and member-finish **function calls, respectively, in an intermediate language.**

However, Aho, in an analogous environment, discloses making **function calls in an intermediate language** (p. 463:1-3, "the front end translates a source program into an intermediate (language) representation from which the back end generates target code").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Lamping to make **function calls in an intermediate language.** The modification would have been obvious because one of ordinary skill in the art would have wanted the option of applying a machine independent code optimizer to the intermediate language representation (Aho, p. 463:7-11).

As per claim 11, the rejection of claim 10 is incorporated and further, Lamping doesn't explicitly disclose that **said intermediate language is non-architecture specific and non-operating system specific.**

However, Aho, in an analogous environment, discloses that **said intermediate language is non-architecture specific and non-operating system specific** (p. 463:1-3, "the front end translates a source program into an (non-architecture and non-operating system specific) intermediate (language) representation from which the back end generates target code").

Therefore, it would have been obvious to a person of ordinary skill in the art, at the time the invention was made, to incorporate the teachings of Aho into the system of Lamping so that **said intermediate language is non-architecture specific and non-operating system specific**. The modification would have been obvious because one of ordinary skill in the art would have wanted the option of retargeting the intermediate representation to a different machine simply by attaching the back end for the new machine to the existing front end (Aho, p. 463:7-11).

As per claims 16, 17, 22, and 23, this is a system version of the claimed method discussed above, in claims 4, 5, 10 and 11, wherein all claimed limitations have also been addressed and/or cited as set forth above. For example, see the Lamping/Aho combination, (Lamping, col. 1:10-5:36 and Aho, p. 428:25-596:13).

Response to Arguments

6. Applicant's arguments with respect to claims 1-28 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

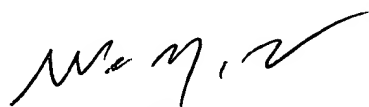
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andre R. Fowlkes whose telephone number is (571) 272-3697. The examiner can normally be reached on Monday - Friday, 8:00am-4:30pm.

Art Unit: 2192

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571)272-3695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARF


WEI Y. ZHEN
PRIMARY EXAMINER